REMARKS

The Official Action mailed February 12, 2003, has been received and its contents carefully noted. Filed concurrently herewith is a *Request for One Month Extension of Time*, which extends the shortened statutory period for response to June 12, 2003. Accordingly, the Applicant respectfully submits that this response is being timely filed.

The Applicant notes with appreciation the consideration of the Information Disclosure Statements filed on January 13, 2000, April 27, 2000, June 9, 2000, January 31, 2001, July 5, 2001, August 15, 2001, October 15, 2001, January 9, 2002, June 7, 2002, and June 9, 2002. The Applicant awaits consideration of the Information Disclosure Statement filed January 3, 2001.

Claims 13-17 and 46-81 were pending in the present application. Claims 13, 17, 46, 50, 51, 55, 59, 60, 63, 64, 68, 72 and 78 have been amended to better recite the features of the present invention, and new claim 82 has been added to recite additional protection to which the Applicant is entitled. Claims 13-17 and 46-82 are now pending in the present application, of which claims 13, 46, 51, 55, 60 and 64 are independent. For the reasons set forth in detail below, all claims are believed to be in condition for allowance.

Paragraph 2 of the Official Action objects to the disclosure for informalities. The Official Action notes that there is no reference numeral 220 in Figs. 12A and 12B. A typographical error appears in each of Figs. 12A, 13F and 14E. In response, the Applicant has corrected Figs. 12A, 13F and 14E by replacing "210" with "220."

The Official Action then asserts that there are no reference numerals 421 and 422 in the figures; however, Fig. 16A shows the references.

The Official Action next asserts that it is unclear why regions 316 to 319, 326, 327, 334 and 335 are n^--type impurity regions. The Applicant respectfully submits that regions 316 to 319, 326, 327, 334 and 335 are formed as low concentration impurity regions. As disclosed in the specification at p. 12, lines 10-22, phosphorous is added into the n^--type impurity regions 111 and 112 through the taper portion of the first gate electrode 108 and the concentration gradient reflects the change in the thickness of the taper portion of the first gate electrode 108 as shown in Fig. 2A. Consequently, low concentration impurity regions 124 and 125 are formed. Similarly, for example in Fig.

13F and 14A, phosphorous is added into the n^--type impurity regions 406 to 409 through the taper portions of the first gate electrode 351 and 361 thus forming low concentration impurity regions 316 to 319, 326 and 327. The same is true of regions 334 and 335 in Fig. 16A. Therefore, regions 316 to 319, 326, 327, 334 and 335 are formed as low concentration impurity regions. The Applicant respectfully submits that the disclosure is clear and understandable. Accordingly, reconsideration and withdrawal of the objection is in order and respectfully requested.

Paragraph 3 of the Official Action objects to claims 17, 50, 59, 63 and 68. In response to this objection, these claims have been amended in conformance with the Examiner's suggestion. Also, new claim 82 has been added to recite a similar feature with respect to independent claim 51. Reconsideration and withdrawal of the objection is in order and respectfully requested.

Paragraph 4 of the Official Action rejects claims 14, 16, 47, 49, 52, 54, 56, 58, 61, 62, 65, 67, 72 and 78 under 35 U.S.C. 112, first paragraph, asserting that these claims contain subject matter which was not described in the specification. Specifically, the Official Action asserts that the specification does not disclose that an angle between the tapered portions of the first conductive layer and the gate insulating film is in a range of 3 to 60 degrees as claimed in claims 14, 47, 52, 56, 61 and 65. The Applicant respectfully disagrees. The range of 3 to 60 degrees is disclosed, for example, at p. 3, lines 24-25 of the "Summary of the Invention."

The Official Action also asserts that the specification does not disclose that the first conductive layer is made of Cr, Ta, Ti, W or Mo and that the second conductive layer is made of Al, Cu, Cr, Ta, Ti, n-type silicon containing phosphorus or silicide as claimed in claims 16, 49, 54, 58, 62 and 67. The Applicant respectfully disagrees. These features are disclosed, for example, at p. 10, line 6 through p. 11, line 3 in the specification.

Paragraph 6 of the Official Action rejects claims 13, 15-17, 46, 48-51, 53-55, 57-60, 62-64, 66-71, 73, 74 and 81 as obvious based on the combination of JP 06-148685 to Nakazono et al. and JP 08-264784 to Kurokawa. The Applicants respectfully submit that a *prima facie* case of obviousness cannot be maintained against the independent claims of the present invention, as amended.

As stated in MPEP §§ 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The prior art, either alone or in combination, does not teach or suggest all the features of the independent claims, as amended. With respect to claims 13-17, 69 and 75, independent claim 13 has been amended to recite that the impurity concentration in the pair of first portions overlapping with the first conductive layer of the gate electrode is smaller than the impurity concentration in the pair of second portions outside the first conductive layer of the gate electrode in at least one of the first TFTs connected to the pixel electrode. The Applicant respectfully submits that Nakazono and Kurokawa to not teach or suggest this feature of the present invention.

With respect to claims 46-50, 70 and 76, independent claim 46 has been amended to recite that the impurity concentration in the pair of first portions overlapping with the first conductive layer of the gate electrode is smaller than the impurity concentration in the pair of second portions outside the first conductive layer of the gate electrode in at least one of the second n-channel TFTs in the driver circuit. Further, side edges of the third conductive layer are coextensive with the edges of the fourth conductive layer in at least one of the third p-channel TFTs in the driver circuit. The

Applicant respectfully submits that Nakazono and Kurokawa to not teach or suggest this feature of the present invention.

With respect to claims 51-54, 71 and 77, independent claim 51 has been amended to recite that the impurity concentration in the pair of first portions overlapping with the first conductive layer of the gate electrode is smaller than the impurity concentration in the pair of second portions outside the first conductive layer of the gate electrode in at least one of the second TFTs in the driver circuit. The Applicant respectfully submits that Nakazono and Kurokawa to not teach or suggest this feature of the present invention.

With respect to claims 55-68, 72-74 and 78-81, the Official Action asserts that it is inherent that the concentration of the impurity in the pair of first portions monotonically increases in a direction from the channel forming region toward the source and drain regions (p. 5, lines 8-10, Paper No. 26). The Applicant respectfully disagrees. Under MPEP § 2112, in order to support a theory of inherency, the Official Action must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the Nakazono and Kurokawa references. The Official Action does not provide a basis in fact and/or technical reasoning to reasonably support the determination that the concentration of the impurity in the pair of first portions in Nakazono monotonically increases in a direction from the channel forming region toward the source and drain regions. Also, the Applicant respectfully submits that there is not a teaching or suggestion relating to the above-referenced feature in Kurokawa. Therefore, the Applicants respectfully submit that Nakazono and Kurokawa do not inherently teach or suggest that the concentration of the impurity in the pair of first portions monotonically increases in a direction from the channel forming region toward the source and drain regions.

Since Nakazono and Kurokawa do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) is in order and respectfully requested.

Paragraph 7 of the Official Action rejects dependent claims 14, 47, 52, 56, 61, 65 and 72 as obvious based on the combination of Nakazono, Kurokawa and U.S. Patent No. 4,394,182 to Maddox, III. Paragraph 8 of the Official Action rejects dependent claims 75-77, 79 and 80 as obvious based on the combination of Nakazono, Kurokawa and U.S. Patent No. 6,114,715 to Hamada. Paragraph 9 of the Official Action rejects dependent claim 78 as obvious based on the combination of Nakazono, Kurokawa, Maddox III and Hamada. The Applicant respectfully traverses each of these rejections.

Maddox and Hamada do not cure the deficiencies in Nakazono and Kurokawa. The Official Action relies on Maddox to teach the angle of tapered portions (p. 6, Paper No. 26) and on Hamada to teach an electroluminescent display device (p. 7, Id.). Nakazono, Kurokawa, Maddox and Hamada, either alone or in combination, do not teach or suggest that the impurity concentration in the pair of first portions overlapping with the first conductive layer of the gate electrode is smaller than the impurity concentration in the pair of second portions outside the first conductive layer of the gate electrode in at least one of the first TFTs connected to the pixel electrode; that the impurity concentration in the pair of first portions overlapping with the first conductive layer of the gate electrode is smaller than the impurity concentration in the pair of second portions outside the first conductive layer of the gate electrode in at least one of the second n-channel TFTs in the driver circuit; that side edges of the third conductive layer are coextensive with the edges of the fourth conductive layer in at least one of the third p-channel TFTs in the driver circuit; that the impurity concentration in the pair of first portions overlapping with the first conductive layer of the gate electrode is smaller than the impurity concentration in the pair of second portions outside the first conductive layer of the gate electrode in at least one of the second TFTs in the driver circuit; and that the concentration of the impurity in the pair of first portions monotonically increases in a direction from the channel forming region toward the source and drain regions. Since Nakazono, Kurokawa, Maddox and Hamada do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) is in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact the Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claims 13, 17, 46, 50, 51, 55, 59, 60, 63, 64, 68, 72 and 78 as follows:

13. (Amended) A semiconductor device having an active matrix display device, said display device comprising:

at least one first thin film transistor formed over a substrate;

a pixel electrode electrically connected to said first thin film transistor;

a driver circuit including at least one second thin film transistor formed over said substrate for driving said at least one first thin film transistor, at least one of said first thin film transistor comprising:

a semiconductor island [on] over an insulating surface [over the substrate];

source and drain regions formed in the semiconductor island;

a channel forming region in the semiconductor island between the source and drain regions;

a pair of lightly doped regions formed between the channel forming region and the source and drain regions wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween,

wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions, which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and

wherein the impurity concentration in the pair of first portions is smaller than the impurity concentration in the pair of second portions.

17. (Amended) A device according to claim 13, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, [(]a goggle-type display[)], a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

46. (Amended) A semiconductor device having an active matrix display device, said display device comprising:

at least one first thin film transistor formed over a substrate;

a pixel electrode electrically connected to said first thin film transistor;

a driver circuit including at least one second n-channel thin film transistor and at least one third p-channel thin film transistor formed over said substrate for driving said [at least one] first thin film transistor,

wherein at least one of said second n-channel thin film transistor comprising:

a first semiconductor island [on] over an insulating surface [over the substrate];

first source and drain regions formed in the first semiconductor island;

a first channel forming region in the semiconductor island between the first source and drain regions;

a pair of lightly doped regions formed between the first channel region and the first source and drain regions,

wherein an impurity concentration in the lightly doped regions is smaller than that in the first source and drain regions;

a first gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween wherein said first gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions, which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer,

wherein at least one of said third p-channel thin film transistor comprising:

a second semiconductor island over an insulating surface;

second source and drain regions formed in the second semiconductor island;

a second channel forming region in the second semiconductor island between the second source and drain regions;

a second gate electrode formed over the second semiconductor island with a gate insulating film interposed therebetween wherein said second gate electrode comprises at least a third conductive layer and a fourth conductive layer formed on the third conductive layer,

wherein side edges of said third conductive layer are coextensive with side edges of said fourth conductive layer.

50. (Amended) A device according to claim 46, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, [()a goggle-type display[)], a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

51. (Amended) A semiconductor device having an active matrix display device, said display device comprising:

at least one first thin film transistor formed over a substrate;

a pixel electrode electrically connected to said first thin film transistor;

a driver circuit including at least one second thin film transistor formed over said substrate for driving said at least one first thin film transistor, [each of said first and] at least one of said second thin film [transistors] transistor comprising:

a semiconductor island [on] over an insulating surface [over the substrate];

source and drain regions formed in the semiconductor island;

a channel forming region in the semiconductor island between the source and drain regions;

a pair of lightly doped regions formed between the channel forming region and the source and drain regions wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween,

wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions, which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and

wherein the impurity concentration in the pair of first portions is smaller than the impurity concentration in the pair of second portions.

55. (Amended) A semiconductor device having an active matrix display device, said display device comprising:

at least one first thin film transistor formed over a substrate;

a pixel electrode electrically connected to said first thin film transistor;

a driver circuit including at least one second thin film transistor formed over said substrate for driving said at least one first thin film transistor, said first thin film transistor comprising:

a semiconductor island [on] over an insulating surface [over the substrate];

source and drain regions formed in the semiconductor island;

a channel forming region in the semiconductor island between the source and drain regions;

a pair of lightly doped regions formed between the channel forming region and the source and drain regions wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions, which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and the concentration of said impurity in the pair of first portions monotonically increases in a direction from said channel region toward the source and drain regions.

59. (Amended) A device according to claim 55, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, [()]a goggle-type display[()], a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

60. (Amended) A semiconductor device having an active matrix display device, said display device comprising:

at least one first thin film transistor formed over a substrate;

a pixel electrode electrically connected to said first thin film transistor;

a driver circuit including at least one second thin film transistor formed over said substrate for driving said at least one first thin film transistor, said second thin film transistor comprising:

a semiconductor island [on] <u>over</u> an insulating surface [over the substrate];

source and drain regions formed in the semiconductor island;

a channel <u>forming</u> region in the semiconductor island between the source and drain regions;

a pair of lightly doped regions formed between the channel <u>forming</u> region and the source and drain regions wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions, which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and the concentration of said impurity in the pair of first portions monotonically increases in a direction from said channel region toward the source and drain regions.

63. (Amended) A device according to claim 60, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, [(]a goggle-type display[)], a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

64. (Amended) A semiconductor device having an active matrix display device, said display device comprising:

at least one first thin film transistor formed over a substrate;

a pixel electrode electrically connected to said first thin film transistor;

a driver circuit including at least one second thin film transistor formed over said substrate for driving said at least one first thin film transistor, each of the first and second thin film transistors comprising:

a semiconductor island [on] over an insulating surface [over the substrate];

source and drain regions formed in the semiconductor island;

a channel forming region in the semiconductor island between the source and drain regions;

a pair of lightly doped regions formed between the channel forming region and the source and drain regions wherein an impurity concentration in the lightly doped regions is smaller than that in the source and drain regions;

a gate electrode formed over the semiconductor island with a gate insulating film interposed therebetween wherein said gate electrode comprises at least a first conductive layer and a second conductive layer formed on the first conductive layer, said first conductive layer having a pair of tapered portions, which extend beyond side edges of the second conductive layer,

wherein the pair of lightly doped regions has a pair of first portions which are overlapped by the pair of tapered portions of the first conductive layer, and a pair of second portions which extend beyond side edges of the first conductive layer, and the concentration of said impurity in the pair of first portions monotonically increases in a direction from said channel region toward the source and drain regions.

68. (Amended) A device according to claim 64, wherein the semiconductor device is one selected from the group consisting of a video camera, a digital camera, a rear-type projector, a front-type projector, a head mount display, [()a goggle-type display[])], a navigation system for vehicles, a personal computer, a mobile computer, a cellular phone, and an electronic book.

72. (Amended) A device according to claim [56] 55 wherein said active matrix display device is a liquid crystal device.

78. (Amended) A device according to claim [56] 55 wherein said active matrix display device is an electroluminescent display device.